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"A COST ACCOUNTING SYSTEM FOR A GLASS MANUFACTURING PLANT"

by

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THIS IS TO CERTIFY THAT THE THESIS PREPARED UNDER MY SUPERVISION BY

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ENTITLED A COST ACCOUNTING SYSTEM FOR A GLASS MANUFACTURING
PLANT

IS APPROVED BY ME AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE

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"A COST ACCOUNTING SYSTEM FOR A GLASS MANUFACTURING PLANT".

Chapter I.

INTRODUCTION.

The subject of this paper is primarily a discussion of the cost accounting system for an integrated industry, consisting of a number of plants, the most important of which is a glass bottle factory which manufactures glass bottles and all sorts of glass containers. The specific plant taken for an illustration and investigation is the plant of the Illinois Glass Co., situated at Alton, Illinois.

This plant is composed of fifteen factories which are engaged in the manufacture of bottles ranging in size from small perfume vials, holding $1/5$ of a dram, to large carboys holding twenty or twenty-five gallons. The bottles are made in all shapes and colors, the most common colors being green, flint and amber.

The nature of the industry is such that it has been found profitable to integrate greatly, because of this the company has purchased several sources of supply. They have gained control of the source of white sand, which is the most important constituent of glass, and in addition to this, they have secured large timber rights in connection with the manufacture of the lumber they use in their boxes.

In order to place the product on the market it has been necessary to add branches to the plant enabling them to place their

products in the hands of the customer in a completed condition. They manufacture the bottles, fit them with corks or metal caps, put them into specially printed boxes, with labels included, and pack them ready to be filled by the customer and shipped. In order to do this, they have established a cork factory, a label printing department, a metal cap factory, and a box factory where they print and manufacture their boxes into which the ware is packed. In addition to these, they have a factory in which they manufacture corrugated paper boxes and packing paper, and a fully equipped foundry and mould room in which they make all their own moulds and patterns.

Glass contains many chemicals in its composition. The materials which enter into the mixing are as follows; white sand, soda ash, two kinds of lime, one a specially prepared and the other the common raw variety, nitre, manganese, antimony, salt, powdered blue, oxide of zinc, borax, copper scale, arsenic, ox-crome, bichromate of potash, cobalt, seacoal, and sulphur. Not all of these are used in any one kind of glass, some being used merely for coloring. These materials are found in various places; only three of the constituents are bought in large enough quantities to deserve particular attention as regards their source. The white sand, by far the largest constituent, is found in many places, but the sand used in the plant is found along the banks of the Missouri River. The lime is taken from the lime stone quarries at Alton, Illinois, and the soda ash is imported from England. The other chemicals are employed only in small amounts and are purchased on contract from one or two concerns.

The unit of most importance in the system is that of

the factory. It is the object of the management to get the most out of each factory and one of the features of the entire cost system is the comparative results shown on its cost report. The costs entering into each factory are approximately the same and the various reports received are compared with each other with an aim to getting the highest results from all. There are two classes of factories in the plant, those in which the bottles are made by hand, and those in which they are made with the blowing machine. As yet the machine made bottles are no more than an experiment. The machines are being developed rapidly however, and, in the manufacture of bottles which have wide mouth necks they have been used to advantage, bringing about a great saving in the expense of production.

In each factory the glass mixtures are melted in large furnaces, prior to being blown. These furnaces are of two kinds, one is which the hot glass is contained in a large tank, the other in which large pots are employed as containers. The pot furnace is the old form of container and is used by only one shift, usually the day shift. In time the entire plant will be equipped with the tank form of container.

Each factory is made up of a certain number of shops the number varying from five to fifteen. In some of the factories the shops work both day and night, or in two shifts. The working year is divided up into periods of two weeks each, and each of the periods are divided into two shifts. The first, or the shifts which work the first of the two weeks in the day time is known as the day shift, and the other, or the shift which works the first of the two weeks in the night is known as the night shift. When the one

works days, the other works nights, but, whether working days or nights, they go by the name which is assigned at the first of the "fire". The time worked by each shop in either shift is nine hours.

The shops in the factory are divided into classes, (1) "Jerico" shops, composed of two blowers and the regular crew of assistants, and (2) "Three Men" shops, or three blowers and the regular crew. The "Jerico" shop is the one to be desired for the blowers all work by the piece and the two men divide the wages received for the ware blown and accepted by the packers. In the "Three Men" shop, each man receives one third of the wage paid the shop, but the "Jerico" shop is given the larger and better-paid-for bottles and is generally composed of the men who have been employed the longest around the plant.

In each shop there are several other men and boys besides the blowers, all working by the day. The usual number of assistants to the shop is four; a carrying-in boy, a snapper-up, a mould boy and a cleaner. The boys are assigned to certain crews at the beginning of the "fire" and remain with the shop assigned to until changed. Every year a certain number of them are selected as apprentice blowers and they work then as extras, etc., until they have served their five year's apprenticeship when they are assigned a place as a regular blower. While they are serving as apprentices, they are paid by the piece, and receive one-half the regular piece wage.

The most important use of any cost accounting system is to collect and summarize the origin and nature of the expenditures which enter into the operation, selling, and administration of the

business, and the sources of information can usually come under one of two heads, material or labor. So in this system the discussion will be conducted along these two lines.

MATERIAL.

Of the two divisions of cost in the glass industry, that of material is by far the smaller. The cost of the various constituents is the largest item under "material" though that of coal is a close second. It is absolutely necessary that the glass furnaces should be kept constantly in a "redhot" condition so that a great amount of coal is used every day. The other materials used in great amounts are (1) fuel oil, which is used to keep the lehrs hot in which the bottles are tempered. (2) moulds, castings etc., from which the moulds are manufactured, (3) packing paper, (4) boxes (5) various items.

LABOR.

This is easily the leading element in the cost system of the plant. Under this head is included all labor entering into the cost of production and the marketing of the product. The wages of the blowers and the boys employed in the manufacture of the ware constitute the largest of them; the wages of the blowers accounting for much the greater part of it. The glass blower is one of the highest paid of any of the modern union men. His wages vary according to the class of ware he is working on and to his skill, but the wages of the average blower range from \$5 to \$15 per day, and, in the case of the exceptional worker, he is able to make as much as \$18 or \$20 per day.

The scale of wages is determined during the summer of each year by a committee representing the Manufacturers Associa-

tion and a committee representing the Green Glass Blowers Association. The two bodies hold separate meetings during the summer, in early July, assembling in joint session later to fix and determine the wage to be given during the ensuing working year. In all these meetings, the principles of collective bargaining rule. Each style of bottle is determined, and the wage to be paid for that bottle at a certain weight is decided upon. All additions to the given weight of the bottle are extras to the blower. The goods are to be paid for in all cases provided they are good ware and are accepted by the packers. In all cases of ware which is "off" in any particular the blower loses, he being paid nothing for this ware. The ware in all cases must be accepted and packed. The wage scale is determined on the basis of gross in the package, in the case of the smaller ware, and by dozen in the case of the larger ware. In the case of the machine blower or operator, the scale is much lower because of the greater capacity of the machine to turn out more ware than the hand blower. He receives a little over half of the gross rate paid to the hand blower. In the blower's union there is a rule requiring new men to serve an apprenticeship of five years. As already stated while serving this apprenticeship, the apprentice receives half-wages.

One of the factors which will completely revolutionize the bottle industry is the automatic blowing machine. The automatic machine is at present only an experiment. If it proves to be successful the cost of production is likely to be reduced nearly one hundred per cent. The present machines require the handling of several experienced men while the automatic will do the work without the need of an operator.

(7).

The other important costs of labor rank as follows; (1) small boy help in the factories, (2) office expenses, (3) packing of ware, (4) warehouse and shipping expenses, (5) other factory help, and (6) the labor costs in the various departments, any one of which is of a smaller amount than any of the departments mentioned above.

As labor is the greatest source of expenditure in the cost of the running of the plant, it must be the object of all concerned in the management to use every check possible to keep a record of the work being done by the various workers on the ground. It is one of the chief objects of the cost accounting system employed to give data which will enable the management to tell who are the "losfers" and "pensioners" and when their identity is established, to secure their discharge from the plant. One of the greatest problems in any business is to have the labor so organized as to get the best results out of every man.

Chapter II.

THE OFFICERS AND DEPARTMENTS.

In order to make a proper description and analysis of the Cost Accounting system it is necessary first of all to describe in outline the principal officials of the plant, their duties, and the various departments of the organization. In this way we will see the relationship which exists between the officials of the plant and the departments which manufacture the goods.

The President is the active head of the company and is in general control of all the departments. He is in addition to this chairman of the Board of Directors. He is employed a great deal of his time in making visits on the representatives of the company and attending the various meetings of the Manufacturer's Association and Wage Conferences. The President as head of the company receives financial reports from the Auditing Department at frequent intervals. He is responsible for the financial management of the company.

The General Manager is the head of the factories and, as his name implies, is the active man of the business. He is the chief of departments and has, as his subordinates, the various heads of departments, who are directly responsible to him. As General Manager of the factories he is particularly interested in the actions and reports of the Cost Department, whose duty it is to keep an accurate record of the various kinds of expense and to see that these expenses are debited to the departments which actually incur the charges. Owing to the fact that the General Manager is responsible to the Directors for the best results that are possible from the factories, he is deeply interested in the

results these reports show and the two departments necessarily work in conjunction.

The Auditor is in charge of the general books of the concern, exclusive of the books of the Cost Accounting system. He has charge of the funds of the company and makes payments when approved by the President or officials under him authorized to approve payments. Corresponding to the relation of the General Manager and the Cost Accountant there is a definite relation between the President and the Auditor. The President is directly responsible to the Board of Directors and stockholders for the funds and financial dealings of the company and it is the most important duty of the Auditor to act as custodian of the funds and in this capacity he makes frequent reports to the President. In addition to this duty the Auditor acts as chief bookkeeper and has particular charge of the collection of slow and overdue accounts. He keeps actively in touch with the debtors of the company and sees that payments to creditors are authorized by officials in time to take advantage of all trade discounts.

The Cost Accountant is the head of the department which has charge of the records of material and labor in the plant. He collects data from the various heads of departments which he incorporates in a bi-weekly report to the General Manager and Directors. He is closely related to the General Manager in his work for the development of the plant to its utmost efficiency.

Aside from his duty of drawing up these bi-weekly reports, which reveal to the management the efficiency of the various departments, the Cost Accountant has another important duty in the collection of detailed information regarding any defects

in or around the plant. Every morning he makes a round of all the factories in search of any data he may be able to pick up which would be of advantage in the improvement of the process of manufacture or which will contribute to saving in any department. In his rounds he inspects such things as the work done in the mould room, he looks over the moulds in the store room which are defective in any particular. Such defects are liable to cause faulty products which may be turned back on the firm as unsaleable, because most of the goods are manufactured for special orders and cannot be unloaded on a general market at anything but a great loss. He reports all deficiencies to the foremen of the factories in which the defects originated. Naturally it is the duty of the foremen to attend to these details but the Cost Accountant merely acts as a check upon their duties.

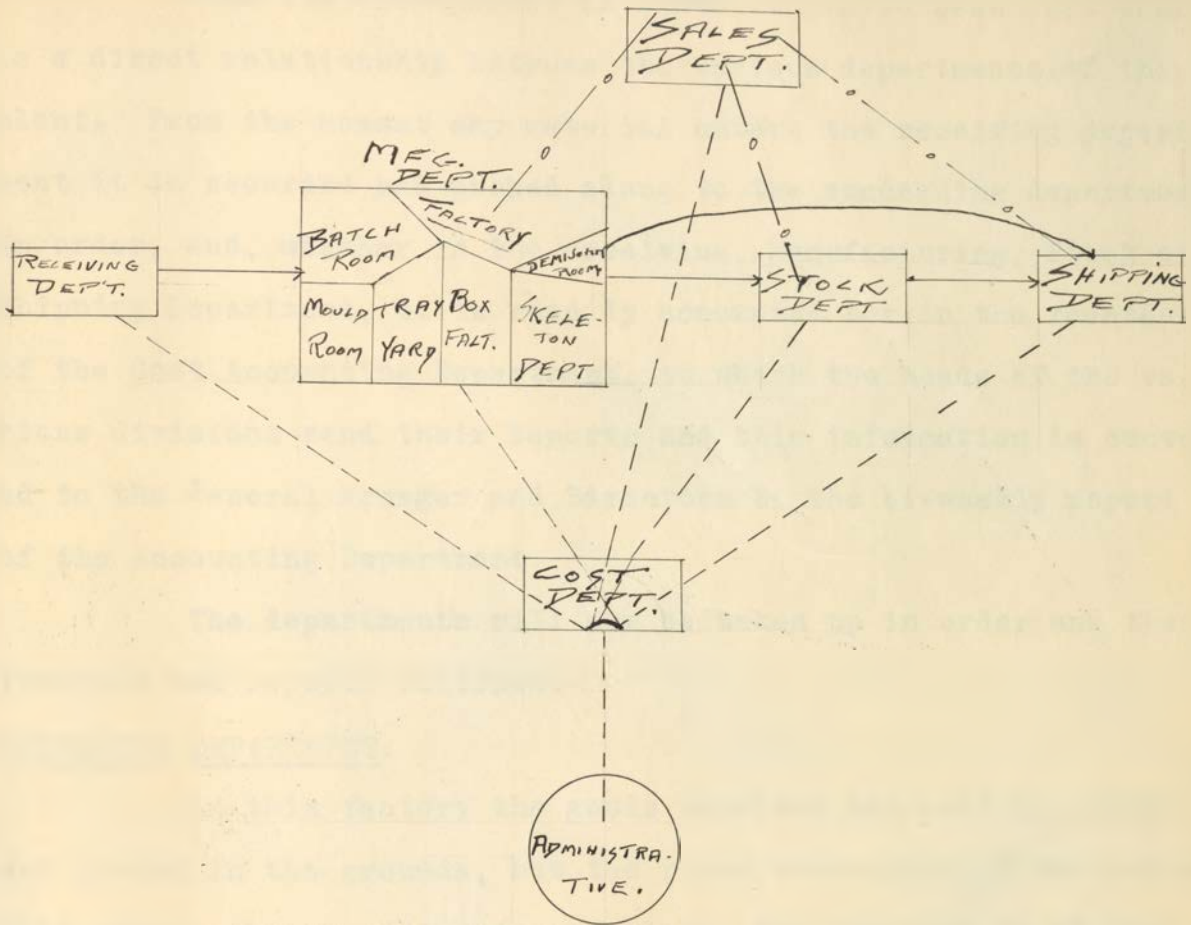
In making his rounds the Cost Accountant picks up bottles on the lehns and examines them, noting any defects in the glass, etc. Sometimes the blower is making the bottles too heavy or is blowing the necks too light, or there are bubbles in the glass, causing the bottles to be thrown aside as "off" ware by the packers. It is to the advantage of both the manufacturer and the blower to get the greatest amount of perfect ware possible and this checking has a very salutary effect. He criticizes and corrects all careless packing. He examines the material going into the glass and sees that it is in proper proportions and of the correct quality. He notes all departments which have any excess labor supply and orders the same to different parts of the factory. He is particularly on the lookout for idlers and loafers. These men are the cause of increased labor cost to the plant and

are discharged when discovered. All defects on the part of the managers and management of the different departments are criticized and a statement of any neglect on the part of any of them, is presented in a report to the General Manager.

These inspection function of the Cost Accountant are so important that the gains made by his suggestions nearly pay for the cost of the Accounting Department.

The plant as a whole is well organized. It is divided into departments, each under the charge of a foreman or superintendent. The different departments take care of the goods and material and an accurate record is kept of everything from the time it enters the yard until it goes out in the form of the finished product. The departments are so arranged with respect to each other that the amount of handling and hauling in the entire process of manufacture from raw material to the finished state is reduced to a minimum.

The relationship between the departments can be shown to advantage by a diagram.



KEY TO DIAGRAM.

————— SHOWS COURSE OF GOODS OR LINE OF MANUFACTURING PROCESS.

----- SHOWS LINE OF REPORTS OF DEPARTMENTS TO CENTRAL AUTHORITY.

—•—•— SHOWS COURSE OF ORDERS.

From the arrangement as shown it can be seen that there is a direct relationship between the various departments of the plant. From the moment any material enters the receiving department it is recorded and pushed along to the succeeding departments in order, and, whether in the Receiving, Manufacturing, Stock or Shipping Department, it is readily accounted for in the records of the Cost Accounting Department, to which the heads of the various divisions send their reports and this information is conveyed to the General Manager and Directors by the bi-weekly report of the Accounting Department.

The departments will now be taken up in order and their function and reports outlined.

RECEIVING DEPARTMENT.

In this factory the goods received are sent to different places in the grounds, but the place where most of the materials except the constituents of glass, are received is at the store room. The store room is in charge of a foreman and several assistants aid him in his duties. All invoices for goods received are sent at once to the Receiving Department in the form of a copy. The copy is in two parts, the one being held at the purchasing department's desk and the duplicate being sent to the Receiving Department. This duplicate is held in the receiving room until the goods arrive and if the receipts correspond to the figures given in the invoice it is returned to the purchasing agent endorsed as received in good or bad order, with statement of damage in case of the latter.

All goods which are to go to any other part of the plant are held in the Receiving Department until the division to

which they are to go sends a requisition to the store room for their delivery. As soon as the duplicate copy of the invoice is returned to the purchasing agent, he sends to the department to which the goods are to go, a slip notifying it that the goods have arrived. The foreman of the department then sends the requisition to the store room under his signature and the goods are delivered.

All goods received are recorded in a receiving book, drawn up as to record the place where sent; time received; time given out; the number of the requisition; a description of the goods, etc.,

Goods which are to go into the store room remain and a material book of the goods received and given out in this way is kept. This serves as a perpetual inventory of the goods on hand. Goods are given out from the store room only on the presentation of a requisition signed by the foreman of the department wanting the goods. This is recorded in the material book after which it is forwarded to the Accounting Department to be charged against the department which receives the goods.

In the case of goods and materials which are received in carload lots the yard foreman takes care of the duplicate copies of invoices, and he has the cars placed in the yard so that the goods can be unloaded and conveyed to the department wanting them at the least cost possible. He sends the slips to the Receiving Department when the goods arrive and they are then recorded in the Receiving Book.

The foreman of the Receiving Department sends a report of the goods received to the Accounting Department every two weeks and this report is checked with the original invoices of goods

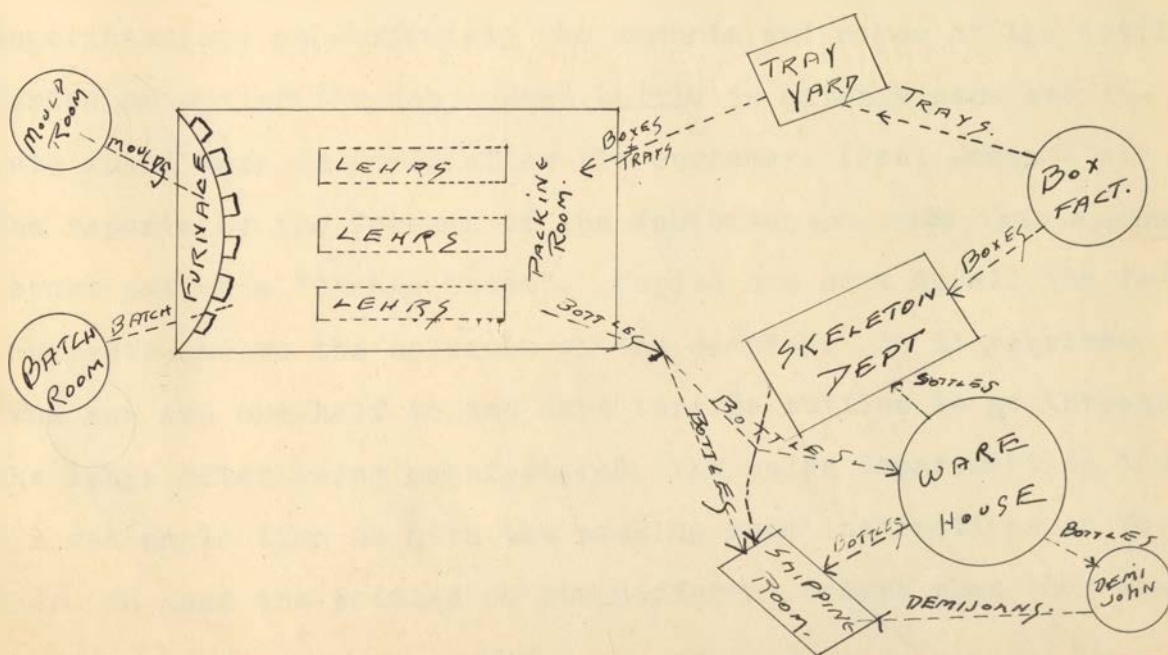
which have been O.K'ed as to price and quantity and recorded.

MANUFACTURING DEPARTMENT.

The Manufacturing Department is made up of several sections, each of which has a definite relation to the others in regard to the fabrication of the ware to its completed condition.

It is made up of the following sections, in the order in which they enter into the process of manufacture; the Batch Room, in which the constituents of glass are mixed; the Mould Room, in which the moulds are stored; the factory, in which the ware is manufactured; and the tray yard, which furnishes the trays to contain the bottles. In addition to these the Manufacturing Department has as indirect sections; the Demijohn Room, in which the bottles are covered with rattan, reed, etc: the Skeleton Department, in which bottles are fitted out and specially packed, on special orders, and finally; the Box Factory, in which the trays, skeleton cases and soda cases are manufactured on separate orders.

Their relation can be plainly shown by a diagram.



The Manufacturing Department is in charge of a Superintendent who has under him several subordinates, viz., the managers of the various sections of the manufacturing department and, in the factories themselves, an assistant superintendent, and a boy boss for each shift.

The Manufacturing Department proper is represented by the factory, as already explained. Orders when received are checked and sorted into two classes (1) those which are in stock, (2) those which are to be manufactured. These latter orders are copied and sent to the office of the manufacturing department. Here they are assigned to the different factories to be made up. The order to manufacture is accompanied by two additional orders, one to the mould room to release the mould required in the manufacture and the other to the tray yard to send the required number of trays or boxes to contain the ware when it is made up. The factory when receiving the order will make it up in accordance with instructions, both for manufacture and shipment and, at the end of each day, the foreman of the various factories will report to the superintendent approximately the amounts and names of the bottles worked on during the day. Each bottle is given a name and the private mould were is named after the customer. (Paul Jones 4's.) The reports of the foremen of the factories are made into a general report called a "Change Sheet". Copies are sent to all the departments and to the salesmen of the company. As it requires from one and one-half to two days for the bottles to go through the lehrs after being manufactured, the sales department is thus allowed ample time to give the packing room instructions as to where to send the bottles on the different orders when they are

packed. If no special instructions are sent to the packing room the goods when packed are sent to the general stock warehouses.

The different sections of the Manufacturing Department are as follows:-

The Batch Room.

The place on the grounds in which the constituents of glass are stored and mixed is the batch room. This room is divided into bins in which the different materials are contained. It is in charge of an expert chemist who is constantly busy making tests with the different constituents in different proportions to see if it is possible to make the output any cheaper, whether any but the best of materials can be used, and the results of different combinations. He has a fully equipped laboratory in which he makes his tests and has an assistant who aids him in his tests and also in the mixing of glass.

The different kinds of glass are mixed in a mixing room and the batches which go into the different factories are mixed separately because, strange as it may seem, each factory gets the best results through having different proportions of raw material in their mixes.

The material in the batch room is kept track of by means of an inventory scheme which records the amounts received each day and that taken out and given to the different factories. The amount given out each day to each factory is recorded in the material book. From the records it is possible at any time to determine the material on hand and also the amount which has been sent to a certain factory during a given period.

The chemist in charge of the batch room sends, each day,

to the Accounting Department, a copy of his record on a blank specially prepared for the same and these slips are recorded in the Accounting Department and assist in the compilation of the bi-weekly report.

Mould Room.

This is the room in which the moulds for the different bottles are shaped and lettered. There are two sections to this department, one in which they are manufactured and the other in which they are stored and cleaned after being used.

The outside of the mould is bought in the form of a casting and is then taken to the machine shop where it is made to conform to the intended shape of the bottle. The labor in this room must be well paid as it is of a very high grade. The workers are all union men and their wages are regulated by collective bargaining, the scale of payment being accepted by both the union and the manufacturer.

The moulds when made are stored in a long store room. They are arranged on shelves and each mould has a name and a number. There are two classes of moulds, the stock moulds and the private stock moulds. As a rule the private stock moulds are lettered and are manufactured at the cost of the customer. They are then the property of the customer and are often removed.

The mould room is in charge of a foreman and he attends to the delivery of the mould to the proper factory when the order comes in. The moulds are kept track of by a duplicate card system. The two cards are filed together when the mould is in the store room. When it is taken out, the duplicate card goes with it, the original remaining in the file. The destination of the

mould is stated on the card.

Whenever the moulds are returned to the store room, they are put into the cleaning room and are cleaned by cheap hand labor, with oil and various tools. This cleaning is considered in the cost of production and is so stated on the report of the Cost Accountant. The foreman of the mould room sends a report to the Accounting Department, stating the amount of time spent in the cleaning of the moulds.

Tray Yard.

In the packing of bottles, each size has a certain box constructed to hold a specified number of bottles, usually one or more gross, according to the size of the bottle. When an order is received in the manufacturing department, a duplicate is sent to the tray yard ordering them to send the required number of trays or boxes to the factory manufacturing the ware. The tray yard then sends whatever boxes it has, and if these are not enough, orders trays to complete the order from the box factory. This department is in charge of a foreman and an adequate crew to transfer the boxes and trays.

Demijohn Department.

This section is employed in the covering of bottles with rattan, cane, etc. Its orders come through the sales and manufacturing departments. The ware is packed and shipped the same as the other classes of bottles.

The Skeleton Department.

Next to the manufacture of bottles proper this branch is the most important of the manufacturing departments. The bottles are received here and cleaned, supplied with paper wrappers

(19):

or cartons, fitted with caps packed in specially printed skeleton cases and made ready to be filled immediately by the customer. It receives its specially printed boxes printed with the name and trade mark of the customer and fitted out with wooden or paper partitions, direct from the box factory. These orders are sent in by its foreman. All work done in the Skeleton Department is extra. The Skeleton Department receives its special orders for skeleton cases and extra work upon the bottles direct from the Sales Department. It gets its bottles from the stock warehouses.

The Box Factory.

This section manufactures the boxes and skeleton cases in which the bottles are contained. It receives its orders from the sales department in the first place, and secondly from the tray yard and the skeleton department. As soon as orders are received, they are sent to the foreman and the boxes are often turned out the same day the order comes in; especially is this true in the case of orders for trays. The skeleton cases require more finish and printing, so their construction is necessarily slower. The box factory is run independently, and a duplicate statement of boxes delivered each day is sent to the Auditing Department to be charged against the company, the duplicate goint to the Accounting Department who charges the department actually receiving the boxes.

All goods manufactured in any section of the Manufacturing Department are turned over to the Sales Department and by it are ordered to either the Stock or the Shipping Department, to be held subject to the orders of the Sales Manager.

THE SALES DEPARTMENT.

The sales department has a three fold relation to the other departments.

In the first place all orders for goods are received in the office and at once turned over to the sales department. The Sales Department holds the orders according to shipping instructions and, in the case of ware not on hand, orders the manufacturing department to make it. All ware manufactured during the day is entered on the report of the manufacturing department called the "Change Sheet". This "Change Sheet" serves as a notice to the Sales Department that an order is completed. When the Sales Department receives this information it makes a record of the fact and then awaits shipping instructions. The ware when made up can either be ordered to the stock department or direct to the shipping room according to the wishes of the Sales Manager. When ordered to ship, the Sales Department prepares two orders, one for the shipping room with instructions as to what to load into the car, and the other to the stock department telling what to turn over to the shipping department. The orders to ship are recorded in the inventory records of the Stock Department and the ware is turned over to the shipper. The shipper checks the ware received from the stock department and the factories with the statement of what the car is to contain. The ware is then shipped and charged to the customer.

THE STOCK DEPARTMENT.

The Stock Department consists of an office and four warehouses into which the ware is stored when manufactured. Two of these warehouses are used to store the stock ware, and the

other two contain the ware made up on contracts which is piled out and is awaiting instructions for shipping.

Each of the warehouses is in charge of a foreman who sees that the incoming ware is placed properly on the floor. He also gives orders to the crews to load the trucks with the ware when it is ordered out by the sales department. Each of these foremen has two record books which are used on alternate days so that one can be in the office being balanced while he is recording in the other. All receipts of ware from the factories, and all ware ordered out by the Sales Department are recorded in these books, which are then posted to a large insurance record book in the office of the Stock Department. In this industry it is very necessary to carry large insurance and this record will at the same time act as a perpetual inventory of the goods in the warehouses.

Each load of ware sent to the Stock Department is accompanied by a slip of the packing room from which it was sent. This slip states the number of bottles on the load, their name and size. The foreman of the stock room checks the loads with the slips, and the latter are then sent into the office where they are checked with the foreman's book of receipts.

The order from the Sales Department to send ware to the Shipping Department is in duplicate and, when the truck is loaded with the ware, the duplicate goes with the load of bottles to the shipping department, where it is used to check with the statement of what the car is to contain, already in the hands of the shipping department. The original goes to the office of the stock department and is checked with the foreman's report and filed.

THE SHIPPING DEPARTMENT.

This is in charge of a chief shipping clerk and has several loading crews each under the orders of a shipping clerk.

As each load of bottles is sent to the shipping department either from the packing rooms or from the stock department to be loaded into the cars, an order accompanies the load. These orders are filed in the office and are checked with the instruction slip which comes to the shipping department, as to which orders and how many cases of ware are to go into the car. The Sales Department makes out this order in the general offices of the company.

The Shipping Department is divided into sections, each representing a large city, where car loads of ware are sent, containing consignments to different customers. The piles accumulate until they make a car load lot. In case the order is a rush one, and at the same time, one which will fill a car, the car is loaded at the packing house or at the warehouse without going to the shipping room at all. This is often the case with ware finished at the Skeleton Department. These skeleton orders are generally large ones so the car is loaded directly at the skeleton department thus saving the cost of handling and hauling to the shipping department. Where a car is loaded at the warehouse or skeleton department one of the regular crews is sent from the shipping department to load.

There is in addition to the regular shipping department a local shipping room to which go all consignments to be forwarded by local freight, or to be hauled in wagons to the boats.

ILLINOIS GLASS COMPANY.

Ware Packed Day and Night Shifts

19

House No.

Weather.

No. Shops DAY

	Shop No.	Names Spare Blowers	Kind of Ware	Blowing Weight	No. Blows Made	Blowers' Price	Blowers' Wages	No. Men in Plant Making Sample	No. Men Off Work	Cause of Off Ware	Slack at Start	Number Packages Packed and Quantity	Slack at Finish	Selling Price	Value of Ware	Total Weight of Ware Packed	Total Wgt. of Off Ware	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Day	1																	
Night	1																	
Day	2																	
Night	2																	
Day	3																	
Night	3																	
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Night	12																	
Day	13																	
Night	13																	
Day	14																	
Night	14																	
Day	15																	
Night	15																	
TOTAL.																		

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Chapter III.

THE DAILY REPORT OF THE FACTORIES.

No Cost Accounting system is complete unless it combines two types of statements, one the outputs of the various departments and the other, the costs incurred in obtaining this output. The object of this chapter will be to discuss the output records of the fabricating section of the manufacturing department of this establishment. The fabricating section is selected because it includes all the principles involved in our system of production records. In this department are manufactured bottles. It is the foundation of the entire business and is its largest department.

Every day the boss packers in the different factories turn in to the Cost Accounting Department a daily report sheet, in which a statement is made of the work done by the two shifts in his factory. This report makes a very detailed statement of the ware taken off the lehrs by the packers. The bottles reported are seldom the ones blown on the day they are reported on the record because the lehrs are very long, and generally two or three days are required for the bottles to pass through them.

As the bottles come off the lehrs they are packed into the boxes, but not before they have been carefully inspected by the packer. Those which are defective in any particular are thrown aside as "off" ware. The blower is paid only for those bottles which are accepted and packed.

Each lehr contains the bottles blown by two or three shops so the packer has the task of sorting as well as inspecting and packing the ware. The ware being packed, the box is stenciled with the size and name of the bottle, the packer's name and the

shop in which it was blown. Each evening the boss packer checks the ware packed and reports it on the sheet. The blowers are not dependent on the record of the boss packer for their basis of wage payment, for each blower has a private memorandum book in which he records his own output and he is entitled to check with the record of the boss packer.

The entries, made on the sheet by the boss packer in the packing room before it is returned to the office, will now be taken up in detail.

As a matter of secondary importance, the boss packer enters on the top of the sheet the date, the condition of the weather and the number of shops working in each shift. Of this information, that of the condition of the weather is the most instructive on the report. This has a decided effect upon the amount of work done, it being almost an impossibility to show a good return of work in the very hot weather.

In Column (1) is indicated the number of the shop. Each factory is made up of a number of shops varying from five to fifteen. At the beginning of the fire, the shop is assigned a regular crew of blowers and a record of the regular crews is kept in the Accounting Department. In case an extra or some other blower works in the shop, the boss packer enters his name in Column (2), so that the Accounting Department will give him, and not the regular man credit for the ware made by the shop.

All bottles made are distinguished by a name given them as already explained. The names of the ware made by the shop are indicated on the sheet with their sizes in ounces. The boss packer inserts the names of the ware in Column (3). It is very im-

portant that he makes no error in reporting these names for the Accounting Department uses this information in filling out another column when it determines the blowing price from the wage scale for the current year.

The wage conference has established a certain weight as standard for each size of bottle. If for any reason the purchaser desires a heavier article, the blower is given an additional wage. For that reason, in Column (4) all blowing weights are entered so that the Accounting Department can give the men their proper wages.

The bottles are put up in uniform boxes each holding the same amount for that class of ware. In the evening the packer counts the ware made during the day and indicates the number of dozen of ware accepted and packed by the packers. He lists this in Column (5). In addition to this, he shows the number of packages and the total quantities, in Columns (12) and (13). The Cost Accounting Department checks the figures as given in these columns.

In case a bottle is a new one and a sample is required, the time spent in making this sample is entered in Column (8). The boss packer keeps a record of this time and it is paid on a time wage basis.

It is to the mutual advantage of the blower and manufacturer to get the greatest amount of good ware out of the shop that is possible, and in order to keep up the efficiency of the shop, and also to act as a source of information as to which are the most efficient shops, a careful record of the "off" ware as well as the perfect ware is taken. From a saving point of view, these figures are one of the best features of the entire cost system. The "off" ware is thrown aside by the pecker and before being

taken away it is counted and the amount is stated in Column (9). In Column (10) is given, so far as possible, the cause for the "off" ware. There are several reasons for this "off" ware. The one which is most common and is most given is "poor workmanship". Bad glass is also a common cause. In 10a of this section the packer indicates the amount of "off" ware opposite the cause. The amounts which are the result of "poor workmanship" are recorded in a record book kept in the Accounting Department under the blower's name. This information serves as a record of the efficiency of the different men when the time comes to give out the choice shops and shifts, as well as a means of giving the managers a record of their poor timber, enabling them to weed out the idlers and poor workmen.

After this "off" ware is counted, it is put into batch wagons, broken up and melted over again the next day along with the new material used in making a fresh fill. The glass is weighed and then recorded in a book as cullet. The weight of the "off" ware or cullet is indicated by the boss packer in Column (18). The Cost Accounting Department keeps a record of the cullet in the factories, and they are debited with any cullet given them and credited with any taken away from them and given to another factory. This is stated on the bi-weekly report sheet where the exact cost incurred for the operation of each factory is determined.

The two Columns (11) and (14) are used to record the slacks. When the ware is packed it is put up in packages each containing a definite number of bottles. At the end of the day there is often a partially filled package which is called a slack. The approximate number of bottles in this slack is recorded when

the shift is through work for the day, and this same amount should appear in Column (14) when the night shift starts, the same being true in the morning, the slack left over by the night shift should appear in the next day's column as slack at the beginning.

The boss packer uses Column (19) to indicate the place to which the goods are sent, in order to give the Accounting Department information as to the exact location of the ware prior to the time of shipment.

After the sheets are filled in to this point, they are taken to the office of the Cost Accounting Department, where they are examined and given to clerks who fill out the other columns from data already in the office, viz;

In Column (6) is entered the blowing price as agreed to in the wage scale accepted in conference between the representatives of the unions and the manufacturers. The figures for the number of dozen of perfect ware packed and the blowing price for that class of ware being given, the blower's wages for the shop are then figured and extended into Column (7).

The wage for the shop as a whole is given, the percentages going to the several blowers of the shop is taken care of in another book. The only object of this sheet is to get the cost of the case of ware.

Once in the office, the sheet is given to a clerk in the Sales Department who enters the selling price per gross in Column (15), from data given in his selling list and special contracts with the customers. The sheets are then figured, use being made of the information in Columns (5) and (15), and the amount is expended into Column (16) as the value of the ware.

Column (17) is computed to determine how much glass was taken out of the tanks during the day and night. The data is taken from Columns (4), (5), and (9).

The different columns are then added on an adding machine and the totals are entered at the foot of each column.

When the sheet has been completely figured up, it is examined by the Cost Accountant, who notes any evidence of poor workmanship, etc., on the part of a factory after which he goes into the yard to determine the precise causes of the poor showing. He goes to the bottom of each offence and sees that conditions are remedied at once.

After the sheets have been carefully examined and checked, the totals of the different columns are then posted to the Production Book. (Form #1) This book is divided into sections each representing a factory, and these sections are themselves divided into periods of two weeks each. The book has the same ruling as the packer's report sheet of the work done in his factory and it is merely a written record of the reports of the various factories. The sections are added and are incorporated in the bi-weekly report of the Accounting Department to the General Manager and Directors. After posting, the sheets are filed, each in the binder representing its factory.

REPRODUCTION BOOK:

FACTORY No.

Two weeks ending

28 a-

[illegible]

	House No. 2	House No. 3	House No. 5	House No. 6	House No. 7	House No. 8	House No. 9	House No. 10	House No. 12	House No. 14	House No. 15	Column #1	Column #2	
MATERIAL														
Gas Fuel	628.62	560.84	612.61	546.07	481.83	466.68	440.83	324.89			173.88			
Gas Ovens													276.46	
Coal O.P. Steam Fuel					33.75								495.88	
" R.F. " "														
Oil	93.44	112.60	120.70	161.20	56.42	84.63	233.74	193.44		116.03	100.00			
Packing Hay	5.13	2.56	12.80				11.20	4.88			2.56		67.84	
" " " "	40.84	95.75	47.47	112.83	64.72	46.82	26.16	84.49			79.50		22.03	
Tools						4.90	4.90						44.10	
Boxes New	9.65	200.21	86.17	191.39	311.30	44.37	68.82	168.19		9.31	159.74		141.70	
Trays & Service Hay	238.00	529.47	2.14			12.36	444.92	334.30					5.81	
" " " Old	177.22	253.80	300.22	224.18	58.50	235.44	12.30	181.04		6.00	44.50		61.74	
Skeleton Cases														7118.91
" " " "														3137.79
Gen. Fact' Bldg' Items													138.40	97.04
Other Washroom Pkgs'														863.02
Food Line Stock													180.30	
Outside Purchases														2606.34
Various Items													1019.94	
Moulds Cages' & Etc.													305.10	27.92
Repairs													199.35	
Skeleton Case West														410.39
Gen. Skeleton Bldg'														36.95
Gen. Skeleton Bldg'	1682.22	1021.04	1403.82	1400.28	548.24	596.53	1353.22	898.34		146.67	786.99			
Gen. Skeleton Bldg'	59.76			39.00			123.70				54.00			
Gen. Skeleton Bldg'														
Gen. Skeleton Bldg'	114.00						205.80	396.00						
Column #1	380.06	380.06	411.84	475.20	190.08	475.20	380.06	380.06	95.04	79.21	411.84			
Repairs														
Total	3428.93	3161.03	3008.77	3380.75	1744.84	1966.92	3305.01	2945.35	95.04	357.16	1733.01	3658.65	14298.36	
Material														
Total Material	3428.93	3161.03	2822.77	3184.31	1744.84	1966.92	3305.01	2045.35	95.04	347.80	1733.01	3658.65	14298.36	
LABOR														
Professors	128.00	128.00	128.00	128.00	128.00	63.00	128.00	128.00		34.00	63.00			
Painters & Floors	100.00	100.00	100.00	100.00	100.00	80.00	116.50	116.50			69.00			
Labour	24.00	35.00	48.00	48.00	14.00	24.00	48.00	48.00		6.00	24.00			
Labour	27.00	63.00	75.00	75.00	29.00	27.00	78.75	78.75		12.00	49.00			
Packing off of labour	170.29	345.75	379.95	420.43	139.13	208.54	350.63	375.80		43.34	228.00			
Clearing Outlet													30.00	
Painting													463.89	
Black Paint													129.23	
Small hole Saws	550.00	622.68	733.06	1672.74	658.73	627.80	1254.97	1113.57		161.22	616.09			
Blowers	2052.69	2260.71	1918.25	5379.53	2358.97	3514.14	4026.49	4321.70		327.22	2421.99			
Moulds Wgt													973.69	
Machine Shop		206.90	268.98											
Repairs to Machine													559.49	
Clearing													101.81	
Blacksmithing													401.62	
Tempering Air & Oil													90.78	
File Filling													69.37	
Various O.P.													199.00	
Storage Coal													123.14	
Plant's Power Plant													102.44	
Firemen's Coat Box Fact'														426.00
Demijohn Dept'														1193.49
Skeleton Case													24.00	
Pot House													43.15	
Tin Shop														273.97
Repairs													60.12	
Capping Dept'													340.48	
Tray Dept'													2164.50	
Warehouses														125.03
Carbox Packing														
Unloading Coal													324.68	
" " " " "													135.79	
Carting Cinders													163.82	
Stopper Grinding S.L.														455.21
" " " " "														276.81
Single Workers					18.82									
Barn Expense													28.00	
Store Room													51.00	
New Skeleton Bldg'														14.00
Gen. Fact' Expense													1424.79	
Expenses after the Office S													2965.92	
Cash Items													352.97	
Repairs #15 Fact'														124.60
Column #1	1273.20	1273.20	1379.30	1591.50	635.80	1591.50	1273.20	1273.20	318.30	265.20	1379.30	12253.55	2954.20	
Total Labor	4278.18	5034.24	5028.54	2403.19	4044.00	6135.92	7274.54	7452.80		848.10	4850.38			
Material	3428.93	3161.03	2822.77	3184.31	1744.80	1966.92	3305.01	2945.35	95.04	347.80	1733.01			
" " " " "	7702.11	8195.27	7851.31	12592.50	5788.80	8102.80	10579.55	10398.15	413.34	1195.90	6583.39			
Value of Ware	6664.14	9572.95	8552.54	13486.76	6475.35	7882.85	13445.89	12027.42		1382.64	7049.79			
Gain		1377.68	701.33	894.26	686.55		2868.34	1629.27		166.74	406.40			
Loss	1037.97					812.95								
WCS' & PRODUCTION														
30 Dozen Ware packed	12821	20600	54811	83775	20623	50042	35359	46070		11373	21620			
" Gross " "	1858	5050	4568	6981	2551	4170	2938	3839		1188	1802			
" Dozen off rejected	1459	6302	2968	5464	1937	3216	2874	4003		1360	1441			
Total wt. packed ware	261480	361589	114420	330769	101077	189401	564803	410894		23199	246683			
" " " " "	20231	42934	115403	24116	8228	13530	53382	38097		3354	16165			
" " " " "	558038	431620	454537	474872	150877	249620	594480	361905		41042	252093			
" " " " "	58	115-6/9	135	157-7/9	147	132-1/9	124-8/9	127-3/4		62	66			
" " " " "	132	264	286	330	144	330	264	264		55	143			
" " " " "	3	40-3/9	22	31-1/9	162	14-4/9	10-1/4			81				
" " " " "	400	357	380	348	307	297	280	206			111			
	29	12-1/2	19	24	22	21	22	14		15	16			Average for coal per 24 hours
	177	132	150	158	49	76	181	115		11	84			No. batch mixed
	9.50	7.73	9.29	9.24	11.19	7.85	7.47	7.81		11.28	9.13			Average cost per batch to pack off
	1.32	1.54	1.44	1.41	.95	1.24	1.40	1.48		.77	1.87			" " " " stop of labour
	10-3/10	06-9/10	.09	.08	.05-5/10	.05	.11-8/10	.09-8/10		.03-3/10	.12-6/10			" " " " gross " " "
	4.28	2.78	2.78	4.89	4.43	3.74	5.02	4.28		2.83	5.03			" " " " shop boy help
	15.91	10.62	9.24	17.89	16.12	20.32	16.11	17.02		5.35	18.85			" " " " for blowing
	4.02	1.90	1.87	1.92	2.54	1.89	3.76	3.13		1.14	3.91			" " " " value per gross
							61.18							" " " " cartboys & demijohns
	7-3/10	10-4/10	18-2/10	6-5/10	6-3/10	6-4/10	8-2/10	8-7/10		8-7/10	6-7/10			Percent of off ware

Chapter IV.

THE REPORT OF THE COST ACCOUNTANT.

The executive officials of any concern should know the following things about their business;

- (1) The department which makes or loses money, the extent of the loss or gain, and the reason why.
- (2) The efficiency of the workers in all departments.
- (3) The nature and extent of all expenditures, are they necessary?
- (4) The possibility of getting further profits by changes in management, etc.

The system which I am describing is drawn up so that it puts into the hands of the officials detailed information enabling them to satisfy these essentials. The information is gathered together in the Accounting Department from data furnished in reports from the various departments, and is presented to the General Manager and Directors in the bi-weekly report of the Cost Accountant. By this report the Directors have a means of determining the exact cost of the previous two weeks, the profits of the several factories, and the cost of the various classes of material and of labor. At the same time it is used as a basis of comparison against the previous two weeks, and all other periods of the same length. At the end of the business year, the figures thus obtained can be used as a basis of comparison with the business of the previous years.

The report is summarized on a large report sheet on which each factory is given a column, in which are reported all

the details affecting cost, and at the bottom are two summary reports entitled, (1) Miscellaneous and Production, and (2) Averages. In addition to these, there are two columns on the right headed Column (1) and Column (2) which will be explained in detail.

COLUMN.(1)

This column of the report sheet has a very important significance. In the first place, the various costs which cannot be attributed directly to the factory causing them are entered here, and at the end of the two weeks, these are added up and the total proportioned among the several factories according to their capacity. In making this division the number of shops in the factory are taken into consideration, as is also the number of shifts. For instance Factory 6 has 15 shops which work in two shifts making thirty shops working in a day. The number of shops in each factory is determined in this way, and each is given its percentage of the total cost of material and labor which has been entered in Column (1). The percentages to be charged against the factories are then charged against them the same as any other cost of production.

COLUMN (2)

In this column all items which are bought or used, but do not enter directly into the cost of production are entered. Good examples of these entries are "Machinery", and "New Skeleton Building", both of which are outlays of expense which cannot be considered as part of the cost of production of bottles.

The sources of the data, and the record of the same on the sheet will now be taken up in detail.

All information received is summarized under two general

heads, "Material" and "Labor"

MATERIAL

Under "Material" the methods used in deriving the costs for the following items will be described. Coal Records, Fuel Oil, the Tray Yard Report, the Box Factory Report, the Stable Report, Outside Purchases, Various Items, Moulds, Castings, etc., Repairs, the Skeleton Department's Report, New Skeleton Building, Batch Report, Cullet Report, and Cost of Machinery.

Coal Records

Every day the cars of coal received are ordered to be put on the track along the side of the factory by which they are to be used. When received the coal is unloaded and thrown into a bin alongside of the furnace.

A yardman is employed by the company to keep track of the cars switched into the yard. He keeps a record book in which he records the number of cars received per day, and upon which track they are placed. In his record, he gives the name of the car and its number. On the invoice received by the company from the coal companies, the name and number of the cars are given in addition to the weight of their contents. The Accountant checks the report of the yardman with the invoices, and the amount specified in the invoice as to the weight of the car and coal is recorded in the cost book against the factory to which the car was assigned. All the coal is bought by contract, at the appropriate prices for the different grades. The yardman signifies the grade of the coal in his report. The coal received during the two weeks by each factory is then charged against it in the bi-weekly report. The yardman also reports upon the amounts of coke received,

and given out to the different factories. There is not so great a use for coke as for coal, so a car is not assigned to the separate factories, but the entire supply is kept in a general coke yard. The yardman charges any factory which receives coke from this yard.

The items marked Coal G.F. and Coal B.F. (steam fuel) are recorded in the same manner by the yard foreman and are entered in Column (1). The G.F. represents coal used by the heating apparatus and B.F. that used by the electric lighting plant.

Fuel Oil Records

There is a great amount of fuel oil used in the plant. When this oil is received it is poured into an immense tank which has pipe connections with the different factories. The oil is pumped from a central pumping station. The foreman of the pumping station keeps a record of the oil on hand and of that taken out of the tank. To secure accuracy it has been found necessary to take two records of the amount of oil withdrawn from the tank. There is a meter attached to the tank and the first record is based on its figures. The second method employed is that of a stick measure, and this second seems to be the better. The mean of the two records is taken as the amount used out of the tank. The amount received is recorded in a book in the pumping station, and it is possible to get a fairly accurate inventory of the oil on hand at any time.

A report of the oil used as computed by the two methods is sent to the Accounting Department every week and is filed here, the data being incorporated in the bi-weekly report.

The amount used by each factory is not determined, but

it is prorated according to the number of burners in the factory which use oil. The total is entered in Column (1). Factories number 12 and 14 burn oil exclusively, and are consequently charged a greater amount.

METER RECORD.					
DATE		No. of GALS.	DATE		No. of GALS.

STICK RECORD.					
DATE		No. of GALS.	DATE		No. of GALS.

The values for these articles are filled in by the Accounting Department from data in its hands. The hay is bought on contract. Customers often return the old trays and strips, and these are valued at about an amount equal to that expended for their return.

Box Factory Report

The box factory sends in to the Accounting Department a bi-weekly report of the skeleton cases, soda cases, demijohn racks, reshipping packages, miscellaneous items, and anything in the way of material from the box factory which is not used directly in the manufacture of bottles. The summary of the different items of this report are entered on the sheet in Column (2), because of the reason already given. The box factory also reports on the nails, strips, miscellaneous items, new stock boxes, trays, etc. which are supplied directly to the factories to act as containers of the bottles manufactured. When these trays etc. are sent directly to the factory it is signified in the report. All those which are not sent directly to the factory are sent to the tray yard and are stored there until needed in the factories for the packing of the ware. The foreman of the the tray yard incorporates in his report to the Accounting Department the number of new boxes sent to the different factories, and the amount is charged against them on the production sheet. The box factory gives a duplicate daily statement of the boxes and supplies furnished the glass company. The duplicate copy goes to the Accounting Department and acts as the source from which the Accounting Department determines the amounts to be charged to the different factories for the box factory supplies they get.

Outside Purchases.

These are items in the glass bottle line which have been purchased from other concerns, and which have been entered into stock, etc. The amount for this item is obtained in two ways, in the first place, the invoices for the goods come in from the outside concern and, after being checked, they are brought into the Accounting Department where they are recorded. In the second place, the stock department send in a report of the goods received in this manner including the source from which received. The amounts given in the report should agree with those given in the invoice. These items are entered in Column (2) because they do not enter into the cost of bottles at the Alton plant. In some seasons of the year the amount of ware received in this way is very large.

Various Items.

"Various Items" include such things as brooms, electric bulbs, fire buckets, tin cups, etc., which are stored in the store room. These are kept track of through the requisitions, against the different factories, from the store room.

Moulds, Castings, Etc.

Moulds, Castings, etc. are recorded from data furnished in a report from the Mould Department. This report is also checked with the invoices received for new moulds and castings.

Repair.

The cost of the materials entering into the repair of a factory is taken from a report of the carpenter shop and blacksmith department, which send in a combined report of any material given out for repair. In the case of any new repair articles re-

BATCH REPORT.

FACORY No.							
SAND							
SODA ASH							
LIME.							
NITRE							
MANGANESE							
ANTIMONY							
SALT							
POWDERED BLUE							
OXIDE of ZINC.							
BORAX:							
LOPPER SCALE							
ARSENIC							
OXICROME BICHROMATE of POTASH.							
COBALT							
TEA COAL							
SULPHUR							
CRYOLITH							
BONE ASH							

SAME ON BACK

Cullet.

Cullet is broken up glass which is melted over and made into new glass, which is used in the manufacture of bottles. The cullet comes from two sources; first, the bottles which are "off" ware in the factories, and secondly, that which is bought from the outside in carload lots. The foreign cullet is bought from many sources, and this class of cullet it is necessary to sort and clean before melting. In the case of the cullet removed from one factory for use in another, the former is credited and the latter charged with the amount. The items are taken care of in the Accounting Department, where a cullet exchange book is kept. This book is posted from slips sent in each day by the chemist, who makes a round of the different factories and reports the amount of cullet used by the factories from the figures furnished him by the foremen in charge of the filling of the furnace in each factory. In each factory there is a set of scales on which this cullet is weighed. There is also a yard pile of cullet and any factory which uses any of this is charged in the same manner as in former cases.

FACTORY No →						
FOREIGN CULLET USED						
OUR OWN USED WHEN EXCHANGED FROM ONE FACTORY TO ANOTHER OR TAKEN FROM YARD SUPPLY						
CREDIT ANY CULLET TAKEN OUT OF A FACTORY						

Machinery.

Whenever any machinery is received which goes into any one factory and enters directly into the manufacture of bottles, it is charged to the factory which receives it, but other machinery received, which does not enter into production directly, is entered into Column (2).

All entries having been made, Column (1) is added and proportioned according to the method already explained. The entire material cost for each factory is then added. From these totals any factory which has had cullet removed from it is given credit by deducting the value of the cullet and a total of the material cost for the two weeks is then given for each factory.

LABOR

The data for all labor costs in the plant are taken from the records of the chief time keeper. In each department the foremen have time books wherein they arrange, in alphabetical order, the names of the men working under their direction. After they have recorded the men who are present in the morning all books are collected and are posted into the general time book. The time books are returned to the foremen in the afternoon. They denote any changes in the afternoon work and these changes are recorded the next morning when the books are again returned to the office.

The main object of the cost sheet under consideration is to obtain, so far as possible, the exact cost incurred by each factory in the entire production of goods. It is possible to determine exactly the cost of the labor in the factory itself which

is directly exerted on the ware, but in the case of other labor scattered around the yard it is impossible to designate exactly what part of its cost was incurred in any one factory. This class of labor is entered in Column (1).

The labor in the factories themselves is recorded in the following manner: In each factory there is a boss or foreman who attends to the time of the men and who is in general charge of the factory. He has a factory time book in which he divides the labor into sections, and these are afterwards set off in the time book. These sections are as follows;

(1) The producers.---Under this head are included the wages of the men who attend to the machinery which mixes the gas and air to produce the heat for the furnace. The labor is unskilled. Two shifts are necessary, for the men are required to work at all times whether the furnace is working or not. One of the essential things around a glass factory is to keep everything hot or it is absolutely impossible to do the work.

(2) Furnace and Floor.---This heading includes the wages of the firemen and in addition the wage of the foreman in charge of the factory. It would also include the expense of keeping the factory clean, etc.

(3) Lehrs.---It is necessary to have one man on the lehrs to keep the fires going and his wages are included in this division of labor.

(4) Small Help Boys.---The boys are the assistants of the blowers and, like them, they are divided into two shifts. Of course their labor is unskilled and their wages vary from .75 cts. to \$2.50 per day. Their time is kept by the foreman of the facto-

ry.

(5) Packing Off The Lehrs.---This type of labor is very important. It is necessary that the packer use very great care in examining and packing the ware, for the company is usually required to replace all packed ware which breaks before being used.

The blower's wages are taken from the Production Book from information conveyed by the "Daily Reports of the Factories"

The labor in all, but a few other cases, is totaled into Column (1), and is prorated among the factories in the manner specified in another part of this paper. The most common exceptions are, "Machine Shop", ie. labor done directly for a particular factory, and "Unloading Coal", which is charged directly against the factory actually receiving the coal. A charge of 7 cts. per ton is made for unloading coal.

The following are the items which are entered in Column (1), and then prorated among the factories:-

Cleaning Cullet,	Pot House,
Repacking,	Tin Shop,
Slack Department	Repairs
Mould Manufacture,	Tray Department,
Repair to Moulds,	Warehouses,
Cleaning Moulds,	Unloading Various,
Blacksmithing,	Carting Cinders,
Pumping Air and Oil,	Hand made Stoppers,
Pipe Setting,	Barn,
Firemen G.F.,	Store Room,
Betterment,	General Factory Expense,
Electric Power Plant,	Taxes, Water, Office, Etc.

Firemen, 1/2 Cost B.F.,

Cash Items, Ex.

The cost of the labor which is not directly used in the manufacture of bottles is entered in Column (2). The cost of this labor is paid by the customers for extra work done on the goods they receive. The departments which are paid for in this manner are;-

Mould Manufacture,

Carboy Packing,

Demijohn Department,

Stopper Grinding, S.I.

Skeleton Department,

Stopper Grinding, C.I.

Capping Department,

New Skeleton Building.

All items being filled in, Column (1) is added and prorated among the different factories. This amount being determined, the total Labor cost is added up. The total Material cost is then brought down and added to the total Labor cost. The value of the ware made for the two weeks is then posted from the Production Book to the sheet, and the difference between the "Value of the Ware" and the "Total Labor and Material Cost" will show the Profit or Loss of the factory. If a profit, the amount is stated in black ink; if a loss, in red ink.

MISCELLANEOUS AND PRODUCTION.

This is a summary of information transferred from the Production Book, which in turn is based upon the "Daily Reports of the Factories". It gives a summary of the number of dozen of ware packed in each factory, the number of gross of ware packed, the number of dozen of "off" ware rejected, the total weight of the ware packed, the total weight of the "off" ware, the total weight of the batch used, the number of shops worked days, the number of shops worked nights, the total shop capacity, the number

of shops short, and finally the number of tons of coal used. This last item is taken from the report of the yard man, in which he states the number of cars of coal, and their weight, received by each factory.

AVERAGES

The last section of the report is computed by the Cost Accountant from his Production Book and the above report. This is a record of the highest value for comparative purposes. It gives the average number of tons of coal used during every 24 hours, the number of batches mixed, the average cost per batch. In addition to this information are given the average cost per shop to pack off the lehrs, the average cost per gross to pack off the lehrs, the average cost per shop for boy help, the average cost per shop for blowing, the average value of the ware per gross, the average value per gross of carboys and demijohns, and finally the percentage of "off" ware in each factory.

The sheets are carefully examined by the Manager and Directors and affords them much help in increasing the efficiency of the plant.

These sheets are filed, and at the end of the fiscal year of the firm are incorporated into a yearly report by the Cost Accountant.

Report of Auditing or Bookkeeping Department.

The Auditing or Bookkeeping Department prepares at the close of the fiscal year a complete financial report for the President and stockholders of the company. In his report he gives a very detailed Profit and Loss Account taken from the financial books of the company. His report of Profit and Loss shows the ac-

tual profit or loss the plant has met with during the year and the figures given in the report of the Cost Accountant should balance with the figures given in his report.

The system just described has met with marked success because it gathers and carefully summarizes all the data affecting cost on an ingeniously arranged report sheet. But this is not all, the Cost Accountant is brought into close touch with all that is going on in the plant, and the executives, through his work, see the inner workings of the entire organization. He becomes virtually a manager in his duties. The main advantages which may be credited to the system are, in brief;

(1) It keeps track of the raw materials, both in costs and quantities.

(2) It makes exact record of all damaged ware showing where damage occurs, the cause, the value of the goods lost, and who is responsible.

(3) It gives an accurate statement of the labor costs in every step of the process.

(4) It shows all other costs and charges and makes an equitable distribution of general items over all kinds and quantities of output.

(5) It enables the management to fix prices for its finished products with accuracy.

(6) It distinguishes the profitable from the unprofitable departments and serves as a dependable basis for the determination of managerial policy

(7) By comparison with the income account it serves as an independent check upon the accuracy of the bookkeeping records.